

PATENT COOPERATION TREATY

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From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing

(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference

see form PCT/ISA/220

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/JP2004/006918

International filing date (day/month/year)

14.05.2004

Priority date (day/month/year)

14.05.2003

International Patent Classification (IPC) or both national classification and IPC

G03G15/08, G03G15/043

Applicant

CANON KABUSHIKI KAISHA

1. This opinion contains indications relating to the following items:

- ☒ Box No I Basis of the opinion
- ☒ Box No II Priority
- ☐ Box No III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No IV Lack of unity of invention
- ☒ Box No V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No VI Certain documents cited
- ☐ Box No VII Certain defects in the international application
- ☐ Box No VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/006918

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/JP2004/006918

Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	18,19,21,22
Inventive step (IS)	Yes: Claims	
	No: Claims	1-31
Industrial applicability (IA)	Yes: Claims	1-31
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

A. CITATIONS

The documents of the International search report (ISR) are introduced as follows:

D1= US,A,5 583 621; **D2=** US,A,2002/044786; **D3=** US,A,6 324 356; **D4=** US,A,5 960 232.

B. EXPLANATIONS

1. Insofar clear, refer to the interpretations in point C. below, and in view of the corresponding dependent claims, substantially the common features of the independent claims 1, 11, 18, 25 relate to a means for storing information for changing at predetermined thresholds with respect to an image bearing surface and dependent on, eg, wear, the exposure energy or bias voltages for charging and developing applied to the photoconductive surface.
2. With reference to the relevant indications in the ISR it is noted that
 - D1 (brother) shows an electrophotographic printer with several levels of toner economizing modes for modulating the dot pulse width of a laser drive signal and controllable by a PC regarding both print quality and toner consumption; that
 - D2 (ricoh) shows an image-forming device using information for regulating the toner-density of an image to be developed so that an adapted developing bias potential supports the image forming potential by a laser light exposure; that
 - D3 (ricoh) shows a colour image forming apparatus having a toner save mode with various flexibly adjustable levels of bias voltage values to develop an image with less toner than standard whilst still maintaining a predetermined optimal colour balance; and that
 - D4 (tektronix) shows a toner cartridge including a developer roller and which is controlled over its useful life by the stepwise adaption of a developing bias voltage, to compensate for an optical density drift caused by an aging developer.
3. Regarding general expertise as cited in the ISR by relevant passages of D2, D3, eg, a skilled design engineer will know both the trade-offs among common toner consumption saving modes and, when selecting a mode of faithful resolution, the

conditions of toner density regulation ie prerequisites to keep the proper potential levels stable for development.

4. Given the task to maintain stable image quality for a long time when developing in a toner consumption saving mode, a skilled design engineer would be expected to scan the prior art for relevant documents about the image forming conditions and to find both D1, prominent on exposure times, as well as D4, prominent on bias voltages for charging and developing.
5. Since D1 shows a save-mode circuit (50 in D1, Fig.3) with a register (55 in D1, Fig.3) for setting exposure times corresponding to four levels ((B), (C), (D), (E) in D1, Fig.4) of an amount of usage ((c) in D1, Fig.5) of an image forming apparatus (1 in D1, Fig.1), the few limiting features of independent claim 18 specifying the storing device of claim 18, are not considered new. Also, there is similar lack of novelty in case of the dependent claims 19, 21, 22.
6. D4 shows a controller (50 in D4, Fig.5) with a look-up table (60 in D4, Fig.5) for adjusting a developer roller voltage (40 in D4, Fig.4) to maintain an optimal optical density (36' in D4, Fig.3) irrespective of the amount of the toner cartridge usage (L in D4, Figs.3, 4) of an image forming apparatus (10 in D4, Fig.1). Being generally known that an optimal optical density depends on the selected toner consumption, refer to the introductory part of D3, therefore, if the storing device known from D4 is to be used under a second toner consumption mode, it is considered obvious to follow-up maintenance of an optimal optical density and still to provide information for changing at predetermined thresholds the bias voltages for developing. Since voltage levels for developing are based with reference to a charging bias voltage, it is also considered obvious to provide information for changing at predetermined thresholds the bias voltages for charging. No inventive step is seen, hence, in any of the storing devices of claims 18, 20, or their use as defined in claims 23, 24.
7. Again with reference to the comments in point C. below, the additional features of the other independent claims 1, 11, 25 specify just standard use options of the known storing device relating to its application, so that the respective subject-matters of these other claims are considered obvious, whether starting a storing device known from D1 or D4.
8. Considering the various known alternatives to further reduce toner consumption as known from the prior art, see the indications in the ISR, all further details defined in the dependent claims are considered to be well within any ordinary follow-up development when starting with any of the storing devices known from D1 or D4.

C. COMMENTS ON INTERPRETATION

1. Independent claim 18 defines a storing device to be used in an image forming apparatus having at least two different toner consumption saving modes including a "second image forming mode", whereby a lower toner consumption is based on information for changing an image forming condition such as exposure times or bias voltages for charging and developing, applied to a photoconductive surface, and on an amount of usage of the image bearing member ie on effects consistent with the constant use of the surface in a toner consumption saving mode, in order to maintain image contrast without fog when using an image bearing member for a long time and in a toner consumption saving mode.
2. The other "independent" claims specify only its use explicitly, ie claims 1, 11 use of the device in, respectively, an image forming apparatus and its cartridge, claim 25 the application of the information to, exclusively, the "second image forming mode".
3. Similarly, sets of corresponding dependent claims seek to specify explicitly standard design options, eg, claims 5, 6; 14, 15; 21, 22; 28, 29 an exposure device and its luminance, claims 7, 8; 16, 17; 23, 24; 30, 31 charging and developing members and their bias voltages.
